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Defense Information Systems Agency
Center for Standards

**DEPARTMENT OF DEFENSE
TECHNICAL ARCHITECTURE FRAMEWORK
FOR
INFORMATION MANAGEMENT**

**Volume 7:
Adopted Information Technology Standards
(AITS)**



Version 3.0

30 April 1996

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FOREWORD: ABOUT THIS DOCUMENT

This edition of the Technical Architecture Framework for Information Management (TAFIM) replaces Version 2.0, dated 30 June 1994. Version 3.0 comprises eight volumes, as listed on the following configuration management page.

TAFIM HARMONIZATION AND ALIGNMENT

This TAFIM version is the result of a review and comment coordination period that began with the release of the 30 September 1995 Version 3.0 Draft. During this coordination period, a number of extremely significant activities were initiated by DoD. As a result, the version of the TAFIM that was valid at the beginning of the coordination period is now "out of step" with the direction and preliminary outcomes of these DoD activities. Work on a complete TAFIM update is underway to reflect the policy, guidance, and recommendations coming from these activities as they near completion. Each TAFIM volume will be released as it is updated. Specifically, the next TAFIM release will fully reflect decisions stemming from the following:

- The DoD 5000 Series of acquisition policy and procedure documents
- The Joint Technical Architecture (JTA), currently a preliminary draft document under review.
- The C4ISR Integrated Task Force (ITF) recommendations on Operational, Systems, and Technical architectures.

SUMMARY OF MAJOR CHANGES

This version of Volume 7 of the TAFIM was preceded by a version labeled as Version 3.0 DRAFT, dated 30 September 1995.

In addition, an interim version of this volume, labeled Version 2.1, was also released in September 1995. The comment resolution period for this interim version was still ongoing at the time the official TAFIM draft was prepared; as a consequence, the standards in this draft are still subject to change based on issues remaining unresolved at this point.

As part of the process of harmonizing Volumes 2 and 7 of the TAFIM, Internationalization Services has been added to Volume 7. Some of the standards in this area are currently under study. Other major additions to this version are the result of the harmonization of taxonomy and terms between Volumes 2 and 7.

A NOTE ON VERSION NUMBERING

A version numbering scheme approved by the Architecture Methodology Working Group will control the version numbers applied to all future editions of TAFIM volumes. Version numbers will be applied and incremented as follows:

- This edition of the TAFIM is the official Version 3.0.
- From this point forward, single volumes will be updated and republished as needed. The second digit in the version number will be incremented each time (e.g., Volume 7 Version 3.1). The new version number will be applied only to the volume(s) that are updated at that time. There is no limit to the number of times the second digit can be changed to account for new editions of particular volumes.
- On an infrequent basis (e.g., every two years or more), the entire TAFIM set will be republished at once. Only when all volumes are released simultaneously will the first digit in the version number be changed. The next complete version will be designated Version 4.0.
- TAFIM volumes bearing a two-digit version number (e.g., Version 3.0, 3.1, etc.) without the DRAFT designation are final, official versions of the TAFIM. Only the TAFIM program manager can change the two-digit version number on a volume.
- A third digit can be added to the version number as needed to control working drafts, proposed volumes, internal review drafts, and other unofficial releases. The sponsoring organization can append and change this digit as desired.

Certain TAFIM volumes developed for purposes outside the TAFIM may appear under a different title and with a different version number from those specified in the configuration management page. These editions are not official releases of TAFIM volumes.

DISTRIBUTION

Version 3.0 is available for download from the DISA Information Technology Standards Information (ITSI) bulletin board system (BBS). Users are welcome to add the TAFIM files to individual organizations' BBSs or file servers to facilitate wider availability.

This final release of Version 3.0 will be made available on the World Wide Web (WWW) shortly after hard-copy publication. DISA is investigating other electronic distribution approaches to facilitate access to the TAFIM and to enhance its usability.

TAFIM Document Configuration Management Page

The latest **authorized versions of the TAFIM** volumes are as follows:

| | | |
|--|-----|---------------|
| Volume 1: Overview | 3.0 | 30 April 1996 |
| Volume 2: Technical Reference Model | 3.0 | 30 April 1996 |
| Volume 3: Architecture Concepts & Design Guidance | 3.0 | 30 April 1996 |
| Volume 4: DoD SBA Planning Guide | 3.0 | 30 April 1996 |
| Volume 5: Program Manager's Guide for Open Systems | 3.0 | 30 April 1996 |
| Volume 6: DoD Goal Security Architecture | 3.0 | 30 April 1996 |
| Volume 7: Adopted Information Technology Standards | 3.0 | 30 April 1996 |
| Volume 8: HCI Style Guide | 3.0 | 30 April 1996 |

Other working drafts may have been released by volume sponsors for internal coordination purposes. It is not necessary for the general reader to obtain and incorporate these unofficial, working drafts.

Note: Only those versions listed above as authorized versions represent official editions of the TAFIM.

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PREFACE

The Adopted Information Technology Standards (AITS) is a product of the Department of Defense (DoD) Defense Information Systems Agency (DISA), Joint Interoperability and Engineering Organization (JIEO), Center for Standards (CFS). It was developed with support from the DoD Commanders-in-Chief (CINCs), Services, and Agencies and was approved by the Standards Coordinating Committee (SCC). Further standards guidance can be found in the AITS companion document, the Information Technology Standards Guidance (ITSG). Both documents may be obtained from:

Help Desk

Department of Defense

Standards Assistance Directorate

DISA/JIEO/CFS/JEBD

10701 Parkridge Blvd

Reston, Virginia 22091-4398

e-mail: Helpdesk@jcdbs.2000.disa.mil

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of the AITS is to guide DoD Enterprise acquisitions and the migration of legacy systems by providing a definitive set of information technology (IT) standards to be used in DoD. These standards provide consistency across the Enterprise, Mission, Function, and Application levels of the DoD Integration Model, as described in Volume 1 of the TAFIM. The goal in providing effective and usable standards guidance is to support the broader TAFIM objectives of:

- Improving user productivity
- Improving development efficiency
- Improving portability and scalability
- Improving interoperability
- Promoting vendor independence
- Reducing life cycle costs
- Improving security
- Improving manageability.

1.2 SCOPE

The AITS is the definitive set of IT standards to be used in the DoD. The AITS applies to all DoD IT programs and initiatives. The AITS is the common DoD IT standards reference applicable to all life-cycle decisions affecting interoperability, portability, and scalability, and is to be used to guide in the development of standards profiles. The Information Technology Standards Guidance (ITSG) provides a foundation for the AITS. The ITSG contains more detailed, supporting information about the state of standardization in each of the subject areas listed in the AITS Figures (see Appendix A), as well as other areas in which standardization has not progressed to the point where adopting a standard is in order (see Section 1.3). These subject areas are called base service areas (BSAs).

The term *adopted* is used to mean that the standards and specifications in the AITS are approved by DoD for use in satisfying each BSA function. This standards guidance is applicable to all systems and programs whether at the leading edge of technology or preserving current operational capability in a long-standing legacy system. Migration toward open system environments (OSE) remains an ever-present goal, because of the enhancement of competition, interoperability, and portability. The following recent directives and instructions were published to support the goal:

- DoD Directive (DoDD) 4630.5, *Compatibility and Interoperability of Tactical Command, Control, Communications, and Intelligence Systems*, promulgated in November 1992, requires that procedures be established for the development, coordination, review, and validation of compatibility, interoperability, and integration of Command, Control, Communications, and Intelligence (C3I) systems. It further stipulates that *all* C3I systems developed for use by U.S. forces are considered to be for joint use.
- DoD Instruction (DoDI) 4630.8, also promulgated in November 1992, directs that the Chairman of the Joint Chiefs of Staff (CJCS) provide amplifying instructions for implementing DoDD 4630.5. DoDI 4630.8 also stipulates that the CFS is responsible for evaluating program acquisition documents (Mission Need Statements (MNSs), Operational Requirements Documents (ORDs), and Test and Evaluation Master Plans (TEMPs)) from an IT standards perspective and that an IT standards profile be developed and submitted for CFS review no later than Milestone II.
- In January 1993, DoDI 8120.2, *Automated Information System (AIS) Life Cycle Management (LCM) Process, Review, and Milestone Approval Procedures*, was promulgated, stipulating that all automated information systems (AISs) programs incorporate standards planning, including the development of IT standards profiles per the TAFIM.
- The entire policy came together in July 1993, with the promulgation of CJCS Instruction (CJCSI) 6212.01, implementing DoDD 4630.5 per direction by DoDI 4630.8. CJCSI 6212.01, replacing MOP 160, effectively combined policies stipulated by DoDD 4630.5 and DoDI 8120.2 by expanding the scope of the CJCS's responsibility for the development, coordination, review, and validation of compatibility, interoperability, and integration of Command, Control, Communications, Computers, and Intelligence (C4I) systems. The fourth *C* (computers) was intended to account for AIS (primarily business systems) under DoDI 8120.2.

At this point, DoD policy clearly stipulates that all C4I systems, now covering the entire spectrum of the DoD Enterprise Model, are required to produce IT standards profiles requiring certification by the CFS.

The AITS does not contain data administration policy, standards, or procedures. These can be found in DoDD 8320.1, *Data Administration*, September 26, 1991, and DoD 8320.1-M-1, *DoD Data Element Standardization*, March 1994.

The adopted standards in the AITS are derived from a larger volume, the *Information Technology Standards Guidance* (ITSG). The AITS and ITSG work together, but perform very different roles. The AITS is intended to contain summary information (i.e., What are the adopted standards?). The role of the ITSG is to provide additional, supporting details about the standards in the AITS, including other related standards and emerging standards (i.e., What else might I need to know other than the fact this standard is adopted?). Figure 1-1 depicts the relationship of AITS and ITSG to their configuration management plan.

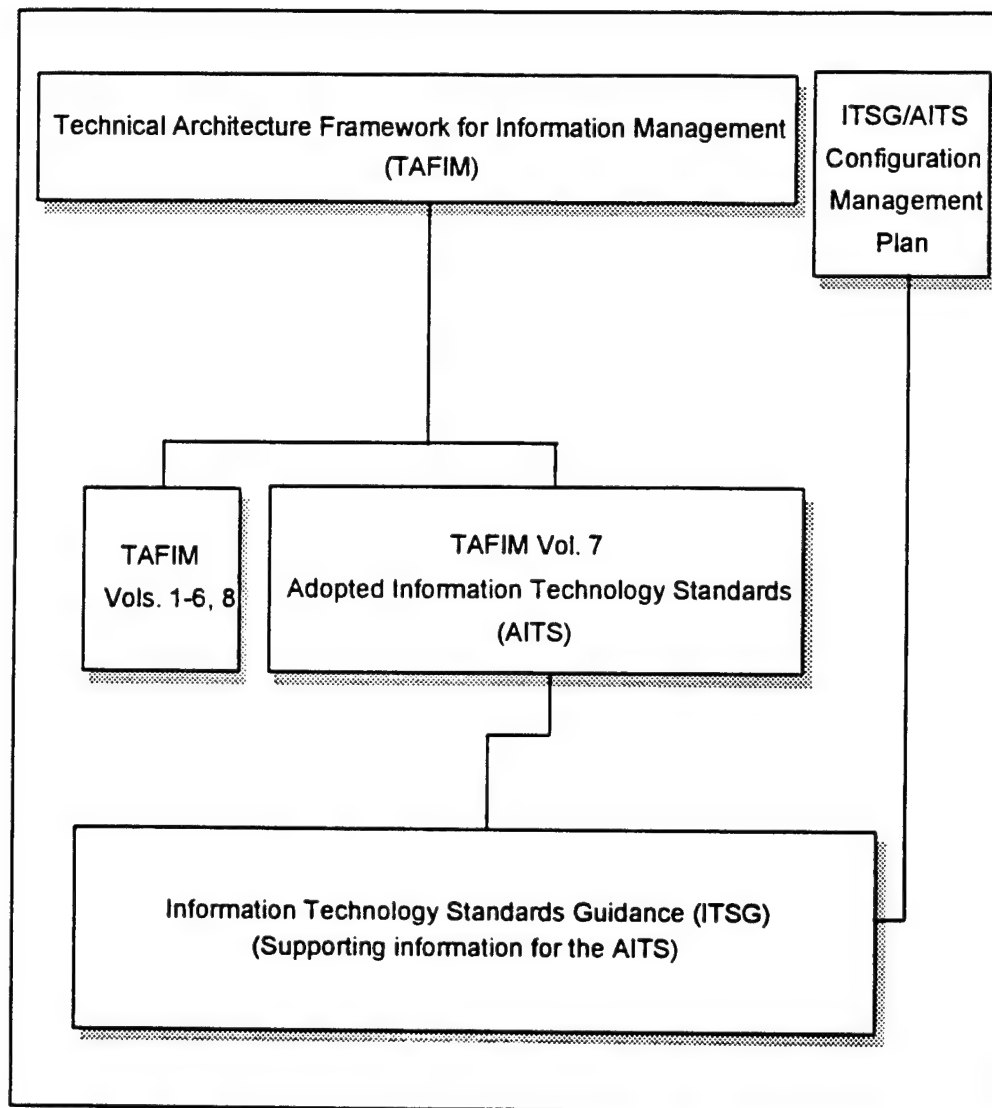


Figure 1-1. Relationship of AITS and ITSG to their Configuration Management Plan

1.3 AUDIENCE

The AITS provides adopted DoD standards guidance policy and the ITSG provides amplifying implementation guidance to:

- Organizational policy makers who develop guiding policies
- System managers and resource sponsors who validate requirements
- System architects and planners who identify the functional requirements needed to fulfill the program or system requirements

- Acquisition officials and supporting system engineers who will utilize the AITS in contractual actions
- Implementors who will use the information to assist in development and modernization efforts not supported by system profiles.

1.4 HISTORY

Originally, DoD IT standards guidance was promulgated as a chapter of the DoD Technical Reference Model (TRM). The TRM was based upon the National Institute of Standards and Technology (NIST) product called the Application Portability Profile (APP). DISA/JIEO/CFS had also embarked on an initiative to provide detailed implementation guidance and develop a consensus-based DoD definition of an OSE with the document called *The Open Systems Environment Profile for Imminent Acquisitions (OSE/IA)*. The TAFIM initiative has captured the collective guidance and information of all these efforts and has now integrated and promulgated it as Volume 7 of the TAFIM, the *Adopted Information Technology Standards (AITS)*. This consensus standards profile is the product of an extensive coordination and review process regulated by the Defense Standardization Program, per DoD 4120.3-M (Defense Standardization Program Policies and Procedures). Its development was accomplished through the support of multiple technical working groups and comprehensive reviews by the CINCs, Services, and Agencies.

1.5 FUTURE STANDARDS REQUIREMENTS

The technology within the focus of the AITS is growing and changing dynamically. Additionally, the standards organizations are actively adding to the body of consensus-based standards. The emerging internationalization of IT standards requirements is stimulating both harmonization and acceleration of standardization activity to accommodate compatibility and competitiveness in the world arena. To meet the challenges of the fast-paced IT domain and the decentralized decision-making essential to the execution of DoD programs, the AITS and accompanying ITSG are evolving together in a manner consistent with events in standards bodies. They will be published on a regular cycle. CFS, within DISA, is responsible for the evolution of the IT standards policy and is prepared to provide customer assistance in applying the information provided. The consumer of AITS and ITSG information is encouraged to contact CFS for assistance or to identify functional requirements and/or standards not yet incorporated into the document. The CFS will appreciate additional inputs on the use of specific standards, deficiencies, and future needs using the response format found in the appendix.

1.6 AITS DEVELOPMENT AND COORDINATION PROCESS

For an explanation of the coordination and configuration management process for the AITS and ITSG, see the *Adopted Information Technology Standards and Information Technology Standards Guidance Configuration Management Plan* (and also Figure 1-1). Version 2.0 of the AITS was the first to achieve approval by the SCC after several transformations of the format and degree of supporting information presented. It constitutes a baseline for the collective set of

IT standards to be commonly used for DoD systems. Versions 2.1 and 2.5 were created to reflect changes prompted by the most recent review of the AITS and ITSG and changes in standards guidance.

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2.0 OSE PRINCIPLES AND THE AITS

2.1 OPEN SYSTEM DEFINITION

The AITS and ITSG together comprise a definition of the service areas supported within the IT domain. This domain is then broken down into lower levels, as is explained below. Through the process of standardization upon a consistent and stable framework, it becomes possible to compare and contrast the efficacy of competing standards and to describe functional requirements, assess standardization needs, and support development of profiles.

Each major heading, Major Service Area (MSA), establishes a grouping of services or functionality defined by industry standards and is expressed in a way to be consistent with the manner in which the standards bodies are addressing these groups. The sub-headings, Mid Level Service Area (MLSA) and Base Service Area (BSA), identify more specific, concrete examples of the functionality under the major grouping. The functionality described by the MSAs, MLSAs, and BSAs defines the services available from the application platform across the platform interfaces, application programming interfaces (APIs), and external environment interfaces (EEIs).

The MSA category is the highest level of IT functionality. MSAs provide the overall set of standards services that support the objectives of application portability and system interoperability. The MSAs include Software Engineering Services, User Interface Services, Data Management Services, Data Interchange Services, Graphics Services, and Network Services.

MSAs are divided into areas, called MLSAs, that provide like functionality and further decompose the IT functionality. This decomposition is intended to provide a more precise description of each MSA. The number of categories in each MLSA varies, depending on the variation and complexity of the functionality included in the MSA.

The BSA is the next level of granularity below the MLSA and provides the most precise description of IT functionality in any MSA. The BSAs further decompose the IT functionality in each MLSA category. The BSAs are fully described in the ITSG.

The ITSG extends the current open systems environment (OSE) definition to enable identification of required functions and services, including those that are not yet supported by standards. In Figure 2-1, the decomposition of the ITSG is shown. Primary TRM definition elements are:

- Application Programming Interfaces (APIs)
- External Environment Interfaces (EEIs).

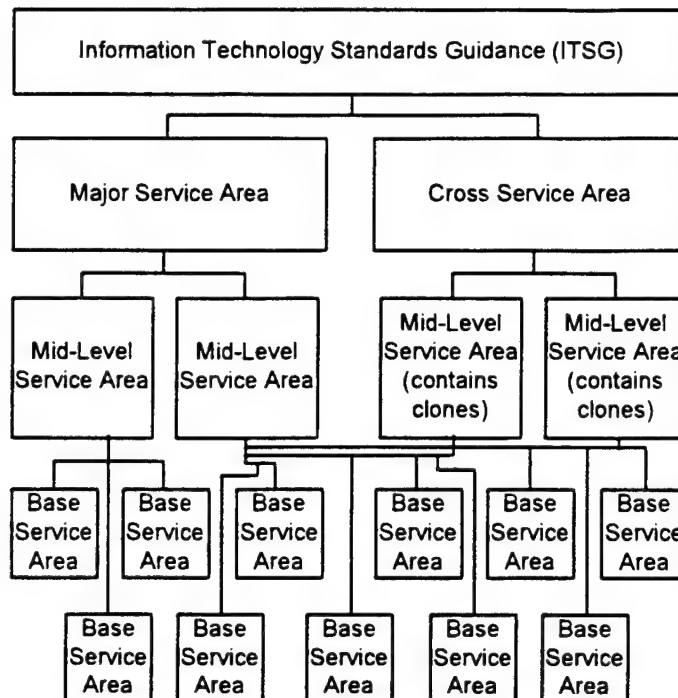


Figure 2-1. Decomposition of the ITSG

The evolving ITSG's OSE definition adds the following elements to complement those OSE elements above:

- Base Service Areas
- Procedural Standards
- Bindings
- Environment Transition Paths.

2.2 STANDARDS AS REQUIREMENTS

Within each program using IT to accomplish system functions, the underlying standards comprise a specialized subset of the OSE Requirements Definition. Standards support the accomplishment of a functional requirement in a manner consistent with common practice, best value, and optimal adaptability to *yet to be identified* requirements. The innovation underway today will be tomorrow's legacy. Effective use of commonly adopted standards to regulate the implementation of definable functions increases the likelihood of adaptability and interoperability throughout the life-cycle of a system or application. However, total expression of OSE requirements using standards is impractical because of the need to specify requirements where no standards exist.

2.3 DoD IT STANDARDS MANAGEMENT

In every instance where there is an identified need for adoption of an open commercial standard to support a DoD requirement, there is an accompanying need to ascertain the appropriate DoD role within the related standardization project.

2.3.1 Standards Leadership and Advocacy Support Role

For those requirements where the technical solution to a DoD requirement falls within the scope of an existing standardization initiative and the technology is relatively mature, it is usually best for DoD's standards representatives to support an existing process and advocate for the unique elements of the DoD requirement. In this way, the DoD requirement becomes aligned with a broadly supported standard and optimizes the opportunity for commercialization of the DoD requirement. The increasing internationalization in the IT market provides greater opportunities for the expression of DoD requirements in a standardization forum where interoperability and compatibility with international allies can be accomplished through open standards.

2.3.2 Product Selection Role

For those requirements where the technical solution is at the forefront of technology, standardization has seldom occurred in time to satisfy the DoD implementation requirement. Clear identification of *best practice* by a standardization organization has not been possible due to the immaturity of the technology and emerging innovations. In these cases, it is sometimes in the best interest to select a most probable *best practice*. This selection must then be supported by an aggressive and effective advocacy throughout the standard's life-cycle by DoD's standards representatives to ensure its adoption in an appropriate open and consensus-regulated standardization body. The life-cycle requirement may motivate escalation of the standardization initiative to an international forum. The preliminary and rapidly evolving definition of the new standard may require specification via mechanisms of lower preference in the hierarchy of standards. As implementations become proven and the technology matures, the DoD goal is to ensure the specification is migrated upward in preference in the hierarchy of standards through the execution of a life-cycle plan for the standard.

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3.0 ADOPTED INFORMATION TECHNOLOGY STANDARDS

3.1 SUPPORTING PROCESS

The evolution of the service areas and supporting standards in the AITS will be guided by the various working groups which will define DoD requirements and evaluate the technical standardization solutions. The CFS will integrate this effort and ensure its timely promulgation through regular updates to the TAFIM.

3.2 DoD INTEGRATION MODEL

The DoD Integration Model, described in Volume 1 of the TAFIM, is a method for achieving functional and technical integration of business processes and information systems. It describes five integration levels, each building on the preceding level.

- Level 1 is the Enterprise (or DoD-wide) Level. Level 1 encompasses information management (IM) elements that are mandatory across the DoD. It includes IT and IM policy, procedures, standards, and doctrine. This level also includes standard IT capabilities such as technical and data standards; reference models; architectures, methods, tools; and shared computing and communications services. The Enterprise Level standards are represented by the AITS.
- Level 2, the Mission Level, is composed of major DoD mission areas such as Command and Control Systems, Intelligence Systems, and Mission Support or Business Systems. At this level, areas of specialization and functional focus emerge and mandatory DoD-wide technical requirements and capabilities are supplemented with mission area specific requirements and capabilities. Mission Level standards guidance is promulgated in a Mission Area Profile based on the AITS.
- Level 3, the Function Level, breaks the mission areas into the multiple activities and processes of the DoD as identified in DoD 8020.1-M. Architectures and standards are defined for the *to-be* functional practices and processes as based on Mission Level architectures.
- Level 4, the Application Level, includes the development, maintenance and operation of individual information systems. In the integration concept, each mission-area application can support a process, an activity, or a complete function. Individual information system profiles are developed in consonance with the applicable Mission and Function Level profiles.
- Level 5, the Personal Level, includes personal productivity tools and individual tailoring of automated capabilities for the end-users. The tailoring must conform to guidelines and procedures that ensure the integrity of shared resources as well as effective operations.

3.3 STANDARDS SELECTION CRITERIA

The AITS addresses IT standards requirements across DoD. The adoption of one specification from among several addressing a common function requires thorough consideration of several criteria. Crucial tests for inclusion of a specification at the Enterprise Level in support of the OSE goal include the public availability of the specification and the consensus process regulating control of the specification's life-cycle. The following are the key criteria contributing to the selection of a standard for inclusion in the AITS. These criteria are an expansion of the criteria used to evaluate standards within the NIST APP.

- **Meets DoD requirements.** DoD functional requirements will determine the standards that are adopted for DoD use. There is a shift away from military-unique specifications and toward *dual use* of commercial technology. Increasing the use of commercial technologies can lower costs for all concerned. In the case of many *process* and *product* standards, best business practice may also be the optimal solution for DoD, even when 100% of DoD requirements may not be satisfied. However, despite all efforts to identify commercially based specifications, there will continue to be unique military requirements warranting DoD defined specifications.
- **Legal requirements.** Requirements based on the law may specifically mandate the use of specific standards. Automated Data Processing (ADP) standards development was excluded from the Federal Standardization Program in 1965 when Public Law 89-306 (the Brooks Act) established a specific program for standardization of ADP. In addition, the Brooks Act has been amended by Public Law 99-500, which expanded the definition of ADP to include certain aspects of telecommunications previously contained in the Federal Telecommunications Standards Program, and by the Computer Security Act of 1987 (P.L. 100-235). The program to standardize ADP, as defined in these public laws, is carried out by NIST. Mandatory Federal Information Processing Standards (FIPS) are listed in the *Federal ADP and Telecommunications Standards Index*, Doc. No. KMR-94-1-A, published by the General Services Administration.
- **Public specification.** Consistency with the ultimate goal of an OSE is a key criterion in the selection of standards. Some specifications offer a good technical solution, but are not available in an open public forum for potential bidders or developers to utilize.
- **Consensus basis.** The level of consensus, both within industry and across the DoD, is an important consideration. Specifications that are controlled by a single corporate entity, unregulated by a *consensus* processes, are not favored. Acquisition guidance advocates competitiveness in procurement to reduce cost and promote innovation.
- **Product availability.** The degree of market support for specific standards predicts future competitiveness among products implemented upon the standard. Degree of product availability and implementation may influence standard selection on the basis of this criteria.
- **Maturity of technology.** The maturity of the technology and/or the uniqueness of innovative application of a proven technology may impact selection of specific standards.

The standards selected for the DoD profile will represent technologies that have matured to the point where standardization is appropriate but that have not reached a point of obsolescence.

- **Testability.** The ability to validate conformance of an implementation with the specified standard may be crucial to the attainment of the required capabilities. This is especially important for those implementations with interoperability requirements. Standards selected *from* the AITS will be those accompanied by standards which define the procedures by which conformance to the standard are measured. Additional consideration is given to standards which have an existing conformance testing infrastructure in place. There is also a need for test beds to research, describe, and document degrees of interoperability and to perform Operational Test and Evaluation (OT&E) of operational systems to verify the effectiveness and compliance of implemented designs.
- **Internationalization.** Election of one specification over another may be influenced by the extent of internationalization, which includes the ability to accommodate different cultural conventions, character sets, and representations. Requirements for interoperability with allies and foreign suppliers may warrant selection of some specification on the basis of its international sponsor or competitiveness in the international market.
- **Legacy implications.** Compatibility with the installed infrastructure is frequently a requirement. Feasibility of retrofit, adaptation, or other accommodating strategy must be considered. Some specifications may also be selected over others to preserve or sustain process consistency. Many process specifications invoke issues of personnel training and context consistency crucial to sustainment of other processes.
- **Security.** DoDD 5200.28, *Security Requirements for Automated Information Systems (AISs)*, 21 March 1988, specifies minimum security requirements for AIS. Also, procedures for determining minimum AIS computer-based security requirements are described to determine the minimum evaluation class required for an AIS as defined in DoD 5200.28-STD, *DoD Trusted Computer System Evaluation Criteria*, December 1985.
- **Preference.** The preceding criteria constitute technical and economic considerations as described in MIL-STD-970. After consideration of these criteria, standards will be selected for adoption based on a preference list. The selection of a standard or specification of lower preference is to be made only when the standards and specifications of higher preference are not technically or economically suitable for use. The order of preference, from top to bottom, is:
 - Standards mandated by multinational treaty or law
 - Non-government standards
 - Adopted international standards
 - Adopted U.S. non-government standards

- Other international or U.S. non-government standards
- Commercial item descriptions
- Performance-based Federal specifications or standards
- Performance-based, fully-coordinated military specifications or standards
- Design-based Federal specifications or standards
- Design-based, fully-coordinated military specifications or standards
- Limited coordinated military specifications or standards
- Locally prepared, one-time-use purchase descriptions.

These criteria are used to select a specific standard for DoD adoption. The priority of each standard selection criterion is determined in the context of the specific system standard solution being evaluated. It is important that the selection criteria used in each standard selection be documented and available for use in justifying deviations in evolving the profile as the technology and specifications evolve. In addition, it is important to establish a preferred ordering of specifications within an area to support practical standards-based solutions while accommodating legacy investments. With each system developed, improved, or updated, it is the overarching objective to consistently move closer to a common, practical OSE solution.

3.4 RELATIONSHIP BETWEEN AITS STANDARDS AND WEAPON SYSTEM STANDARDS

The standards in the AITS have a much broader range of applicability than just information processing systems. They are equally applicable to other systems, such as weapon systems. AITS standards in Major Service Areas such as data interchange, operating systems, and security are as needed by many weapon systems as mission critical computer resources (MCCR) standards are. The magnitude of the usability is reflected in Figure 3-1.

Among the Major Service Areas of the AITS that contain standards useful to military weapon systems are user interface (e.g., keyboard device layout, user interface style guides), data management (e.g., data dictionary/directory services), data interchange (e.g., physical interface, image data interchange, geospatial data exchange, tactical communications), graphics (e.g., symbology graphics), networking (e.g., connectionless service), operating systems (e.g., real time services and interfaces), system management (e.g., fault monitoring), and security (e.g., authentication).

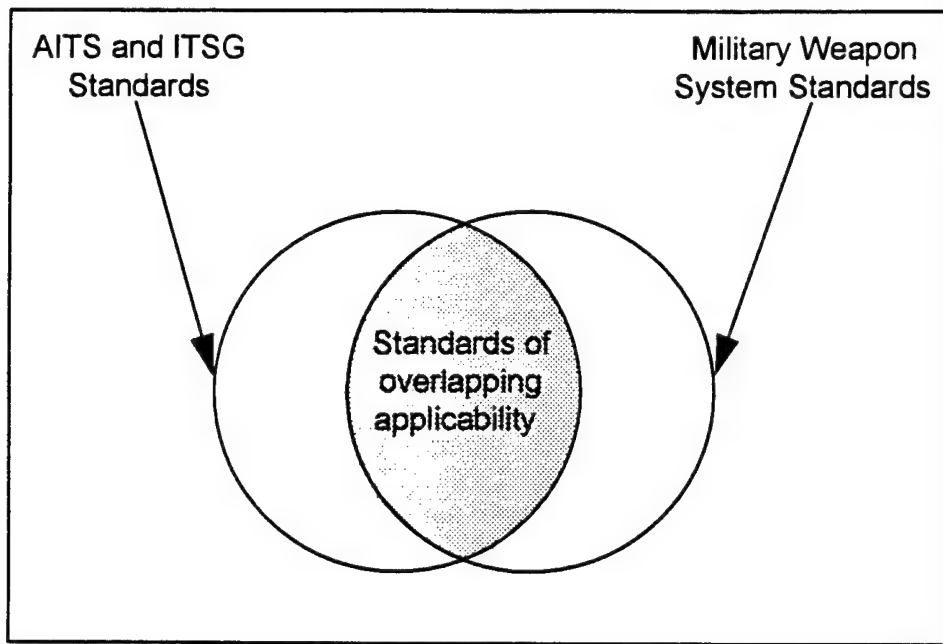


Figure 3-1. AITS Standards and Weapon System Standards

3.5 ADOPTED INFORMATION TECHNOLOGY STANDARDS

The AITS are represented in Appendix A as a high-level tabular matrix organized by the MSAs of the DoD TRM. Each Major Service Area in the TRM is represented in the AITS as a collection of MLSAs. MLSA are composed of smaller, defined services called BSAs. A BSA might contain an Adopted Standard selected to meet the functional requirements of the BSA if the adopted standard meets the criteria previously listed.

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4.0 APPLICATION OF THE ADOPTED INFORMATION TECHNOLOGY STANDARDS

4.1 OVERVIEW

The AITS provides the Enterprise Level OSE guidance which, when applied to DoD systems, will move DoD to an open system environment and facilitate interoperability, transportability, and scalability of applications. Each system must select from and augment the AITS with standards and specifications that apply to the specific functions the system performs. For example, an intelligence system may have a specific set of standards that differs from a finance system, based on required OSE functionalities, but both systems will comply with the AITS.

A system is designed and developed to perform specific functions. The DoD Integration Model, introduced in Section 3.1, is based on the fact that systems within a functional area share many common requirements. Interoperability is enhanced by the use of a common foundation of standards within the functional domain.

The AITS provides the Enterprise Level standards guidance for DoD. All upper level profiles must comply with the AITS selected standards to meet specific system functions. Mission profiles address functional requirements common to a mission domain. Mission domain analysis identifies functionality sets to be supported by standards-based implementations. Mission area profile development leads to the definition of additional functional areas with supporting standards. The process supporting the AITS life-cycle utilizes these standards efforts to generate standardization projects supporting identified needs.

Functional Level profiles provide greater refinement of specific capabilities required to achieve performance objectives. Functional profiles may be applicable in multiple missions and in a repeatable manner throughout the enterprise.

The system designer is encouraged to select standards and specifications for these functions using the amplifying guidance in the ITSG. These standards and specifications together with the standards selected from the AITS will form the system profile. This system profile should be similar to most of the systems within a specific mission and function. Application Level profiles include very detailed standards implementation information.

4.2 INFORMATION TECHNOLOGY STANDARDS GUIDANCE (ITSG)

The ITSG is a companion document to the AITS, containing additional detail necessary for the selection of Mission, Function, and Application-Level standards. The ITSG is divided into the TRM major service areas: software engineering, user interface, graphics, data management, data interchange, network, operating system, system management, security, distributed processing, and internationalization services. The ITSG refines these service definitions, identifying over 350 BSAs in the DoD OSE that might be required in a DoD acquisition. These range from

broad areas such as programming languages to detailed services such as shared memory, help screens, and object request broker standards. For each service, the ITSG identifies consensus-based industry and DoD standards, as well as unilaterally controlled specifications. It discusses deficiencies with competing standards and identifies related standards areas. It highlights emerging standards expected to effect pre-planned product improvements or technology insertion. Each service description concludes with a DoD consensus recommendation on the standards to be applied if this OSE service is required.

4.3 RESPONSIBILITIES

4.3.1 DISA Center for Standards (CFS)

DISA CFS has the responsibility for developing standards and standards guidance for the DoD. This guidance is contained in the AITS and the ITSG. Guidance on the use of standards for OSE functions not covered in the AITS is provided in the ITSG.

DISA CFS will provide assistance in the development of profiles. DISA CFS will also certify profiles for compliance with DoD open system guidance.

DISA CFS will maintain a library of all profiles, particularly those at the Mission and Function Level that form the basis for higher-level profiles.

4.3.2 Mission/Functional Area Architects

Based on the requirements of their domain, mission and functional area architects will develop profiles that provide guidance for their levels of the integration model. These profiles will be based on the AITS and, in the case of functional profiles, will be based on the respective mission area profile. The developer will submit the profile to DISA for certification.

4.3.3 System Designers

Systems designers will develop their application profile based on specific system requirements and the relevant functional area profile or profiles.

4.3.4 Acquisition Officials

Acquisition officials will use the profile of standards in contractual actions and ensure that standards required on a contract are consistent with the AITS and the IM integration model hierarchy of profiles.

4.3.5 Implementors

Implementors will baseline their existing systems in preparation for migration to their defined system OSE objectives. Implementors will establish their target OSE definitions and ensure that standards are incorporated in the development and evolution of the system to meet their defined OSE objectives.

APPENDIX A.

THE ADOPTED INFORMATION TECHNOLOGY (AITS)

A.1 AITS FIGURES

| MAJOR SERVICE AREA: SOFTWARE ENGINEERING SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| CASE tools and environments | |
| Software development environment | ANSI/IEEE 1209-1992 (Evaluation and Selection of CASE Tools) |
| Specialized language and compiler tools | ISO/IEC 9945-2:1993 (POSIX, part 2: Shell and Utilities) |
| (Alternative) | X/Open C436:1994 (Commands and Utilities) |
| <p>Software life cycle processes</p> <p>[Pending completion of IEEE 1498/EIA 640, MIL-STD-498 is recommended for use subject to Agency/Service policy. ISO/IEC DIS 12207 Software Life Cycle Processes is currently in the international standardization process.]</p> <p>[In light of DoD's new policy on MIL-STDs, MIL-STD-498 is in the process of becoming an IEEE standard.]</p> | |
| Software life cycle processes | MIL-STD-498 (Software Development and Documentation) |
| Configuration management | ANSI/IEEE 828-1990 (Software Configuration Management Plans) |
| (Complementary) | ANSI/IEEE 1042-1987 (Guide to Software Configuration Management) |
| | MIL-STD-498 (Software Development and Documentation) |
| Documentation | MIL-STD-498 (Software Development and Documentation) |

| MAJOR SERVICE AREA: SOFTWARE ENGINEERING SERVICES | |
|--|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Joint reviews (Complementary) | ANSI/IEEE 1028-1988 (Software Reviews and Audits) |
| | MIL-STD-498 (Software Development and Documentation) |
| Software requirements (Complementary) | ANSI/IEEE 830-1984 (Guide to Software Requirements Specifications) |
| | MIL-STD-498 (Software Development and Documentation) |
| Software design (Complementary) | ANSI/IEEE 1016-1987 (Recommended Practice for Software Design Descriptions) |
| | ANSI/IEEE 1016.1-1993 (Guide for Software Design Descriptions) |
| | ANSI/IEEE 990-1987 (Recommended Practices for Ada as a Program Design Language) |
| | MIL-STD-498 (Software Development and Documentation) |
| Software management indicators (Complementary) | MIL-STD-498 (Software Development and Documentation) |
| | ISO/IEC 9126 (Quality Characteristics and Guidelines for their Use) |
| | ANSI/IEEE 982.1-1988 (Standard Dictionary of Measures to Produce Reliable Software) |
| | ANSI/IEEE 982.2-1988 (Guide for the Use of Standard Dictionary of Measures to Produce Reliable Software) |
| | ANSI/IEEE 1045-1992 (Software Productivity Metrics) |
| | ANSI/IEEE 1061-1992 (Software Quality Metrics Methodology) |

| MAJOR SERVICE AREA: SOFTWARE ENGINEERING SERVICES | |
|--|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Software testing and product evaluation (Complementary) | ANSI/IEEE 829-1983/R1991 (Software Test Documentation) |
| | ANSI/IEEE 1008-1987 (Software Unit Testing) |
| | NIST FIPS PUB 132 (Guide for Software Verification and Validation Plans) |
| | ANSI/IEEE 1012-1987 (Software Verification and Validation Plans) |
| | ANSI/IEEE 1059-1993 (Guide for Software Verification and Validation Plans) |
| | MIL-STD-498 (Software Development and Documentation) |
| Software quality assurance (Complementary - by sponsor) | ISO 9001:1987 (Model for Quality Assurance) |
| | ISO 9000-3:1991 (Guidelines for Application of ISO 9001) |
| | ANSI/IEEE 730.1-1989 (Software Quality Assurance Plans) |
| | IEEE 1298-1992 (Software Quality Management System) |
| | MIL-STD-498 (Software Development and Documentation) |
| Software problem categories/priorities (Complementary) | IEEE 1044-1993 (Classification for Software Anomalies) |
| | MIL-STD-498 (Software Development and Documentation) |
| Software safety | MIL-STD-882 (System Safety Program Requirements) |

| MAJOR SERVICE AREA: SOFTWARE ENGINEERING SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Software support (Complementary) | MIL-STD-498 (Software Development and Documentation) |
| | ANSI/IEEE 1219-1993 (Software Maintenance) |
| Software distribution | OSF DME: Distributed Services |
| License management | OSF DME: License Management |
| Languages | |
| Ada (Complementary) | ISO/IEC 8652:1995 (Ada95) |
| | NIST FIPS PUB 119-1 (Ada95) |
| C (Complementary) | ANSI/ISO 9899: (C) |
| | NIST FIPS PUB 160 |
| FORTRAN (Alternative) | NIST FIPS PUB 69-1 (FORTRAN-77) |
| | ISO 1539:1990 (FORTRAN-90) |
| COBOL | NIST FIPS PUB 21-4 (COBOL) |
| JOVIAL | MIL-STD-1589C, Notice 1, 1994 (JOVIAL) |
| MUMPS (aka <i>M</i>) | NIST FIPS PUB 125-1 (MUMPS aka M) |
| Bindings | |
| Ada bindings (Complementary) | ISO 9075:1992 (Binding to SQL) |
| | ISO/ANSI 9593-3:1990 (Binding to PHIGS) |
| | IEEE 1003.5-1992 (POSIX Ada Language Interfaces) |
| | IEEE 1003.5b (POSIX Ada Real Time Binding) |

| MAJOR SERVICE AREA: SOFTWARE ENGINEERING SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | ANSI X3.168-1989 (Embedded SQL and SQL Ada Module Extensions) |
| | NIST FIPS PUB 127-2 (SQL, for Ada bindings) |

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| MAJOR SERVICE AREA: USER INTERFACE SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| User Interface | |
| Keyboard device layout | ISO 9995-1..8:1994 (Keyboard Device Layout) |
| Graphical Client-Server Operations | |
| Data stream encoding | NIST FIPS PUB 158-1 (X-Windows) |
| Data stream interface | NIST FIPS PUB 158-1 (X-Windows) |
| Subroutine foundation library | NIST FIPS PUB 158-1 (X-Windows) |
| Raster data interchange (Alternative) | MIL-PRF-28002 (CALS Raster) |
| | NIST FIPS PUB 150 (Group 4 Facsimile) |
| | NIST FIPS PUB 158-1 (X-Windows, for BDF) |
| User interface management system | NIST FIPS PUB 158-1 (X-Windows) |
| Communication between GUI client applications | OSF Motif AES 1.2: ICCCM, v 1.0 |
| Data interchange format for GUI-based applications (Complementary) | OSF Motif AES 1.2: ICCCM, v 1.0 |
| | NIST FIPS PUB 158-1 (X-Windows) |
| Compound text encoding | X/Open CTE, v1.1 |
| X logical font description | X/Open XLFD, v1.3 |
| Object definition and management | |
| 3-D appearance | NIST FIPS PUB 158-1 (X-Windows, for PEX) |
| GUI internationalization support | X/Open G304:1993 (Internationalisation Guide) |

| MAJOR SERVICE AREA: USER INTERFACE SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Interchange format for design tools | COSE Motif |
| Application programming interfaces | IEEE 1295-1993 (Motif) |
| Language bindings for bit-mapped GUIs | IEEE 1295-1993 (Motif) |
| Style guide | DoD HCI Style Guide, v. 3.0; TAFIM Vol. 8 |
| User interface definition language | OSF Motif AES 1.2: UIDL |
| Window management | |
| Independent window management services | OSF Motif AES 1.2 |
| Multiple displays | OSF Motif AES 1.2 |
| Style guide | DoD HCI Style Guide, v. 3.0; TAFIM Vol. 8 |
| Drivability | DoD HCI Style Guide, v. 3.0; TAFIM Vol. 8 |
| On-line help | DoD HCI Style Guide, v. 3.0; TAFIM Vol. 8 |
| Commands, menus, and dialog | DoD HCI Style Guide, v. 3.0; TAFIM Vol. 8 |
| Character-based user interface | |
| Style guide | DoD HCI Style Guide, v. 3.0; TAFIM Vol. 8 |
| Electronic forms | JIEO-E-2300 (Electronic Forms Systems) |

| MAJOR SERVICE AREA: DATA MANAGEMENT SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Database management system | |
| Basic database services (Complementary) | NIST FIPS PUB 127-2 (SQL) |
| | NIST FIPS PUB 193 (SQL Environments) |
| Index sequential access (Complementary) | X/Open D010:1990 (ISAM Developers' Specification) |
| | X/Open C215:1992 (Data Management, Issue 3: ISAM) |
| Multidatabase APIs | X/Open P303:1993 (SAG Call Level Interface) |
| Database administration | DoDD 8320.1 (DoD Data Administration) |
| Electronic forms | JIEO-E-2300 (Electronic Forms Systems) |
| Data dictionary/directory services | |
| Data dictionary | NIST FIPS PUB 156 (IRDS) |
| Transaction processing | |
| Protocol for heterogeneous interoperability | ISO 10026-1,2,3:1992 (OSI Distributed Transaction Processing) |
| Transaction manager-resource manager interface | X/Open C193:1992 (XA Specification) |
| Transaction demarcation | X/Open P209:1992 (TX Specification) |
| Transaction manager to communications manager interface (Complementary) | X/Open S423:1994 (XA+ Specification) |
| | X/Open P306:1993 (XATMI Specification) |
| | X/Open P305:1993 (TxRPC Specification) |

| MAJOR SERVICE AREA: DATA MANAGEMENT SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Distributed queuing | IEEE P1003.15 (POSIX Batch Extensions) |

| MAJOR SERVICE AREA: DATA INTERCHANGE SERVICES | |
|--|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Characters and symbols | |
| Font information exchange | ISO 9541-1,2,3:1991-94 (Font Information Interchange) |
| Hardware applications | |
| External data representation | ITU-T X.409 (XDR for use with X.400) |
| Circuit design data exchange | NIST FIPS PUB 172 (VHDL) |
| Bar coding | MIL-STD-1189B (Standard DoD Bar Code Symbolology) |
| Physical interface (Alternative) | NIST FIPS PUB 22-1 (Synchronous Signalling Rates between Data Terminal and Data Communication Equipment) |
| | NIST FIPS PUB 100-1 (DTE/DCE Interface) |
| | NIST FIPS PUB 166 (4800/9600 bps 2-wire duplex modems) |
| | NIST FIPS PUB 167 (9600 bps four-wire duplex modems) |
| | NIST FIPS PUB 168 (12000/14400 bps 4-wire duplex modem) |
| | NIST FIPS PUB 169 (Error correction in modems) |
| | NIST FIPS PUB 170 (Data compression in V.42 modems) |
| | PCMCIA PC Card Standard, Release 2.1 |
| Optical digital technologies | |
| Read-only optical discs | ISO 9660:1988 (Volume/file structure for CD-ROM) |

MAJOR SERVICE AREA: DATA INTERCHANGE SERVICES

| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
|---|---|
| Write-once optical discs (Complementary by size) | ISO/IEC 9171-1:1990 (Unrecorded 130mm WORM) |
| | ISO/IEC 9171-2:1990 (Recording format for 130mm WORM) |
| | ANSI X3.191-1991 (130mm WORM) |
| | ANSI X3.211-1992 (130mm WORM) |
| | ANSI X3.214-1992 (130mm WORM) |
| | ISO/IEC 11560:1992 (130mm WORM using Magneto-Optical Effect) |
| | ANSI X3.220-1992 (130mm WORM using Magneto-Optical Effect) |
| | ISO/IEC 10885:1993 (356mm WORM) |
| | ANSI X3.200-1992 (356mm WORM) |
| Rewritable optical discs (Complementary by size) | ISO 10900:1992 (90mm Optical Disk, Rewritable and Read Only) |
| | ISO 10089:1991 (130mm Rewritable Optical Disk) |
| | ANSI X3.212-1992 (130mm Rewritable Optical Disk Using Magneto-Optical Effect) |
| Document interchange | |
| Document exchange (Alternative) | MIL-PRF-28001 (CALS SGML) |
| | NIST FIPS PUB 152 (SGML) |

| MAJOR SERVICE AREA: DATA INTERCHANGE SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Custom definition of document types | NIST FIPS PUB 152 (SGML) |
| Electronic forms interchange | JIEO-E-2300 (Electronic Forms Systems) |
| Technical data interchange | |
| Vector graphics data interchange (Alternative) | MIL-PRF-28000 (CALS IGES) |
| | NIST FIPS PUB 177 (IGES) |
| | MIL-PRF-28003 (CALS CGM) |
| | MIL-STD-2301A (NITFS CGM) |
| | NIST FIPS PUB 128-1 (CGM) |
| Product data interchange (Alternative on CALS) | MIL-PRF-28000 (CALS IGES) |
| | NIST FIPS PUB 177 (IGES) |
| | ISO/IEC 10303:1994 (STEP) |
| | MIL-STD-1840B (Automated Interchange of Technical Information (CALS)) |
| Business data interchange | NIST FIPS PUB 161-1 (EDI) |
| Raster/image data interchange | |
| Raster data interchange (Alternative) | MIL-PRF-28002 (CALS Raster) |
| | NIST FIPS PUB 150 (Group 4 Facsimile) |
| | NIST FIPS PUB 158-1 (X-Windows, for BDF) |

| MAJOR SERVICE AREA: DATA INTERCHANGE SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Image data interchange (Complementary) | MIL-STD-2500A (NITFS, v. 2.0) |
| | MIL-HDBK-1300A (NITFS) |
| DoD applications | |
| Military logistics and document support (Alternative) | MIL-STD-1840B (Automated Interchange of Technical Information (CALS)) |
| | MIL-STD-498 (Software Development and Documentation) |
| | MIL-STD-1388-2B (LSA Record) |
| Geospatial data exchange (Alternative) | MIL-STD-2407 (Vector Product Format) |
| | MIL-STD-2401 (World Geodetic System) |
| | STANAG 3809 (Digital Terrain Elevation Data) |
| | STANAG 7074 (Digital Geographic Information Exchange Standard (DIGEST)) |
| | NIST FIPS PUB 173-1 (Spatial Data Transfer Standard) |
| | MIL-STD-2411 (Raster Product Format) |
| Symbology graphics (Alternative) | MIL-STD-2525 (Common Warfighting Symbology) |
| | MIL-STD-2402 (Symbology Standard) |
| | WMO Document #49 (Meteorological Services) |
| | MIL-STD-1295A (Helicopter Cockpit Display Symbology) |
| | MIL-STD-1787B (Aircraft Display Symbology) |

| MAJOR SERVICE AREA: DATA INTERCHANGE SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Exchange of formatted military messages (Alternative) | Interim MIL-STD-6040 and CJCSM 6120.05 (MTF) |
| | STANAG 5500 and ADATP 3 (MTF) |
| | MIL-STD-6011 (TADIL A and B) |
| | MIL-STD-6004 (TADIL C) |
| | STANAG 5501 and ADATP 31 (Link 11) |
| | STANAG 5504 and ADATP 4 (Link 4) |
| | STANAG 5511 and ADATP 11 (Link 11 and 11B) |
| | STANAG 5516 and ADATP 16 (Link 16) |
| | STANAG 5601 and ADATP 12 (Ship-Shore-Ship Buffer) |
| | MIL-STD-2500A (NITFS, v. 2.0) |
| | Joint Pub 3-56.20 through 23 (Multi-TADIL Operating Procedure) |
| | JIEO Multi-TADIL Data Extraction/Reduction Guide |
| | JTIDS TIDP-TE (TADIL J) |
| | Interim JTIDS Message Specification (IJMS) Decision Paper 4 and 5 |
| | IJMS Decision Paper 6 (IJMS SOP) |
| | MIL-STD-6013 (ATDL-1) |
| | Variable Message Format (VMF) TIDP-TE |

| MAJOR SERVICE AREA: DATA INTERCHANGE SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Tactical communications (Alternative) | MIL-STD-2045-44500 (TACO2 for the NITFS) |
| | MIL-STD-188-203A-1 (TADIL A) |
| | MIL-STD-188-212 (TADIL B) |
| | MIL-STD-188-203-3 (TADIL C) |
| | MIL-STD-188-220 (Digital Message Transfer Device (DMTD)) |
| Continuous Acquisition and Life-Cycle Support (CALS) (Complementary) | MIL-STD-1840B (Automated Interchange of Technical Information (CALS)) |
| | MIL-HDBK-59B (CALS Implementation Guide) |
| | MIL-M-87268 (IETM General) |
| | MIL-D-87269 (Database Revisable IETM) |
| | MIL-Q-87270 (IETM Quality Assurance) |
| | MIL-STD-974 (Contractor Integrated Technical Information Service - CITIS) |
| Compression | |
| Text and data compression | X/Open C436:1994 (Commands and Utilities) |
| Still image compression (Alternative) | NIST FIPS PUB 147 (Group 3 Compression) |
| | NIST FIPS PUB 148 (General Facsimile) |
| | NIST FIPS PUB 150 (Group 4 Facsimile) |
| | ITU-T T.4-1988 (Group 3 Compression) |
| | ITU-T T.6-1988 (Group 4 Compression) |

| MAJOR SERVICE AREA: DATA INTERCHANGE SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | ITU-T T.81-1993 (JPEG) |
| | MIL-STD-188-196 (NITFS Bi-Level) |
| | MIL-STD-188-197A (NITFS ARIDPCM) |
| | MIL-STD-188-198A (NITFS JPEG) |
| | MIL-STD-188-199 (NITFS Vector Quantization) |
| | ISO/IEC 10918-1 (JPEG) |
| Motion image compression | ISO 11172-1,2,3:1993 (MPEG) |

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MAJOR SERVICE AREA: GRAPHICS SERVICES

| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
|---|---|
| Raster graphics | |
| Raster data interchange (Alternative) | MIL-PRF-28002 (CALS Raster) |
| | NIST FIPS PUB 150 (Group 4 Facsimile) |
| | NIST FIPS PUB 158-1 (X-Windows, for BDF) |
| Still image compression (Alternative) | NIST FIPS PUB 147 (Group 3 Compression) |
| | NIST FIPS PUB 148 (General Facsimile) |
| | NIST FIPS PUB 150 (Group 4 Facsimile) |
| | ITU-T T.4-1988 (Group 3 Compression) |
| | ITU-T T.6-1988 (Group 4 Compression) |
| | ITU-T T.81-1993 (JPEG) |
| | MIL-STD-188-196 (NITFS Bi-Level) |
| | MIL-STD-188-197A (NITFS ARIDPCM) |
| | MIL-STD-188-198A (NITFS JPEG) |
| | MIL-STD-188-199 (NITFS Vector Quantization) |
| | ISO/IEC 10918-1 (JPEG) |
| Vector graphics | |
| Vector graphics API (Complementary) | NIST FIPS PUB 153 (PHIGS) |
| | ISO/IEC 9592-4:1992 (PHIGS PLUS) |
| Vector graphics data interchange (Alternative) | MIL-PRF-28000 (CALS IGES) |
| | NIST FIPS PUB 177 (IGES) |
| | MIL-PRF-28003 (CALS CGM) |

| MAJOR SERVICE AREA: GRAPHICS SERVICES | |
|--|-----------------------------------|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | MIL-STD-2301A (NITFS CGM) |
| | NIST FIPS PUB 128-1 (CGM) |
| Device interfaces | |
| Device interface API | ISO/IEC 9636-1..6:1991 (CGI) |

| MAJOR SERVICE AREA: COMMUNICATIONS SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Application services | |
| File transfer | MIL-STD-2045-17504 (FTP) |
| Remote file access | OSF DCE 1.1: DFS |
| Message transfer (Complementary) | ANSI/IEEE 1224.1 (X.400 E-mail API) |
| | ACP 123 |
| | ACP 123 US SUPP-1 |
| Terminal emulation | MIL-STD-2045-17506 (Remote Login Profile) |
| Remote login | MIL-STD-2045-17506 (Remote Login Profile) |
| Remote procedure call | OSF DCE 1.1: RPC |
| Directory services (Complementary) | ITU-T X.500/01/09/11/18/19/20/21/25 |
| | ANSI/IEEE 1224.2 (Directory/Name Space API) |
| | ISO 8822, 8823, 8326, 8327 |
| | MIL-STD-2045-17505 (DNS) (legacy systems) |
| Addressing (Alternative) | ITU-T X.500:1993 (OSI Directory (ISO 9594)) |
| | ISO 8823, 8327 |
| | IEEE 802.2 (1992) |
| | MIL-STD-2045-14502-1A/4/5 (Internet Transport Profile) |
| Protocol for interoperability in heterogeneous transaction processing systems | ISO 10026-1, 2,3:1992 (OSI Distributed Transaction Processing) |

| MAJOR SERVICE AREA: COMMUNICATIONS SERVICES | |
|--|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Connection establishment/release (Alternative) | ISO 8823, 8327 |
| | MIL-STD-2045-14502-1A/2/3 (Internet Transport Profile) |
| | X/Open C303 (XAP) |
| | IEEE P1003.1g (POSIX protocol - Independent Transport Service) |
| | MIL-STD-2045-14503 (RFC 1006) |
| Connectionless service (Alternative) | ISO 9576/9548 (Connectionless Presentation/Session Protocol) |
| | MIL-STD-2045-14502-1A/4 (Internet Transport Profile) |
| | IEEE P1003.1g (POSIX protocol - Independent Transport Service) |
| | IEEE 802.2 Type I (1992) |
| Translation (Alternative) | RFC 1327/1495 (SMTP to X.400 gateway) |
| | MIL-STD-187-700A |
| Transport services | |
| Routing/Relay | MIL-STD-2045-13501 |
| Network gateways | MIL-STD-188-105 (per MIL-STD-187-700A) |
| Network error recovery | MIL-STD-2045-14502-1A/2/3 (Internet Transport Profile) |
| Network flow control | MIL-STD-2045-14502-1A/2/3 (Internet Transport Profile) |
| Network sequencing | MIL-STD-2045-14502-1A/2/3 (Internet Transport Profile) |
| Priority/precedence | MIL-STD-2045-14502-1A (Internet Transport Profile) |

| MAJOR SERVICE AREA: COMMUNICATIONS SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Distributed timing service | OSF DCE 1.1 |
| Multicast (Alternative) | ITU-T X.6 (Multicast) |
| | MIL-STD-2045-14502-1A (Internet Transport Profile) |
| Subnetwork technologies | |
| CSMA/CD (Alternative) | MIL-STD-187-700A |
| | MIL-STD-2045-14502-4/5 (Internet Transport Profile) |
| Token bus | MIL-STD-187-700A |
| Token ring | MIL-STD-187-700A |
| Distributed queue dual bus (DQDB) | MIL-STD-187-700A |
| FDDI (Fiber optic) | MIL-STD-187-700A |
| Integrated services digital networks (ISDN) | MIL-STD-187-700A |
| LAPB | MIL-STD-2045-14502-2 (Internet Transport Profile) |
| DDN X.25 | MIL-STD-2045-14502-3 (Internet Transport Profile) |
| Frame relay | MIL-STD-187-700A |

| MAJOR SERVICE AREA: COMMUNICATIONS SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Asynchronous transfer mode (ATM) | MIL-STD-187-700A |
| Combat net radio digital subnetwork (Complementary) | MIL-STD-188-220A (Digital Message Transfer Device (DMTD)) |
| | MIL-STD-2045-14502-6A (Internet Transport Profile) |
| Secondary imagery transmission | MIL-STD-2045-44500 |

| MAJOR SERVICE AREA: OPERATING SYSTEM SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Kernel operations | |
| File management services | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Input/output control | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| System operator services | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Process management and core operating system services | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Environment services | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Hardware error and event conditions | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| System resource limits | NIST SP 500-224 (OIW SIAs for OSEs) |
| Message queues | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Login services | X/Open C434, C435, C436 (Single UNIX Specification) |
| Storage device management | OSF DCE 1.1: DFS |
| Threads interface | OSF DCE 1.1: Threads |

| MAJOR SERVICE AREA: OPERATING SYSTEM SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| (Alternative) | IEEE 1003.1c (POSIX Threads Extension) |
| Threads extension language binding | NIST SP 500-224 (OIW SIAs for OSEs) |
| Kernal language bindings (Alternatives comple- mentary to FIPS 151-2) | IEEE 1003.1b:1993, 1003.1g |
| | NIST FIPS PUB 151-2 (POSIX.1) |
| | IEEE 1003.5-1992 (POSIX Ada Language Interfaces) |
| | IEEE 1003.9 (POSIX FORTRAN Binding) |
| Media handling | |
| Backup and restore (Complementary) | NIST FIPS PUB 151-2 (POSIX.1) |
| | NIST FIPS PUB 189 (POSIX.2) |
| Floppy disk format and handling | NIST FIPS PUB 189 (POSIX.2) |
| Data interchange format | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Shell and utilities | |
| Commands and utilities | NIST FIPS PUB 189 (POSIX.2) |
| Print management (Alternative) | NIST FIPS PUB 189 (POSIX.2) |
| | ISO 10175 (Document Printing Application) |
| Language bindings to POSIX.2 | NIST FIPS PUB 189 (POSIX.2) |
| Shell programming language | NIST FIPS PUB 189 (POSIX.2) |
| User-oriented commands and utilities | NIST FIPS PUB 189 (POSIX.2) |

| MAJOR SERVICE AREA: OPERATING SYSTEM SERVICES | |
|--|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| File and program editing services | NIST FIPS PUB 189 (POSIX.2) |
| Batch scheduling | NIST FIPS PUB 189 (POSIX.2) |
| Real time extensions | |
| Memory management (Complementary) | NIST FIPS PUB 151-2 (POSIX.1) |
| | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Scheduling (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| | NIST FIPS PUB 151-2 (POSIX.1) |
| Semaphores | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Asynchronous I/O | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Asynchronous event notification | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Synchronized I/O | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Real time file system | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| POSIX.1b language bindings | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Fault management services | |
| Fault management | NMF Omnipoint 1 |
| Clock/calendar services | |
| Clocks and timers | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Real time timers | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Distributed timing service | OSF DCE 1.1: DTS |

| MAJOR SERVICE AREA: OPERATING SYSTEM SERVICES | |
|--|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Operating system object services | |
| Object request broker | CORBA Specification Rev. 2.0, 1994 |

MAJOR SERVICE AREA: SYSTEM MANAGEMENT SERVICES

| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
|--|--|
| State management | |
| Independent window management services | OSF Motif AES 1.2 |
| Batch scheduling | NIST FIPS PUB 189 (POSIX.2) |
| Process management and core operating system services | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| System administration and management APIs (Alternative) | NIST SP 500-224 (OIW SIAs for OSEs) |
| | NMF Omnipoint 1 |
| | IEEE 1224 |
| | X/Open C206 (XMP) |
| Scheduling | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| (Complementary) | NIST FIPS PUB 151-2 (POSIX.1) |
| User/Group management | |
| User/Group identification | IEEE P1387.3 |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Configuration control | |
| Software configuration management | ANSI/IEEE 828-1990 (Software Configuration Management Plans) |
| (Complementary) | ANSI/IEEE 1042-1987 (Guide to Software Configuration Management) |

| MAJOR SERVICE AREA: SYSTEM MANAGEMENT SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | MIL-STD-498 (Software Development and Documentation) |
| Data dictionary | NIST FIPS PUB 156 (IRDS) |
| System configuration | NMF Omnipoint 1 |
| Network configuration management | NMF Omnipoint 1 |
| Usage management and cost allocation | |
| Accounting management | NIST FIPS PUB 96 |
| Performance management | |
| Software management indicators (Complementary) | MIL-STD-498 (Software Development and Documentation) |
| | ISO/IEC 9126 (Quality Characteristics and Guidelines for their Use) |
| | ANSI/IEEE 982.1-1988 (Standard Dictionary of Measures to Produce Reliable Software) |
| | ANSI/IEEE 982.2-1988 (Guide for the Use of Standard Dictionary of Measures to Produce Reliable Software) |
| | ANSI/IEEE 1045-1992 (Software Productivity Metrics) |
| | ANSI/IEEE 1061-1992 (Software Quality Metrics Methodology) |
| Performance management (Complementary) | NIST FIPS PUB 144 |
| | NMF Omnipoint 1 |
| Network flow control | MIL-STD-2045-14502-1A/2/3 (Internet Transport Profile) |

| MAJOR SERVICE AREA: SYSTEM MANAGEMENT SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Network sequencing | MIL-STD-2045-14502-1A/2/3 (Internet Transport Profile) |
| Communication of management information | MIL-STD-2045-38000 |
| Managed information base | MIL-STD-2045-38000 |
| Input/output control | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Event management | NMF Omnipoint 1 |
| (Alternative) | NIST SP 500-224 (OIW SIAs for OSEs) |
| Fault management | |
| Software safety | MIL-STD-882 (System Safety Program Requirements) |
| Network error recovery | MIL-STD-2045-14502-1A/2/3 (Internet Transport Profile) |
| Fault management | NMF Omnipoint 1 |
| Storage device management | OSF DCE 1.1: DFS |
| Backup and restore | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | NIST FIPS PUB 189 (POSIX.2) |
| Hardware error and event conditions | NIST FIPS PUB 151-2 (POSIX.1) |
| (Complementary) | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| Error and event logging | NMF Omnipoint 1 |

| MAJOR SERVICE AREA: SYSTEM MANAGEMENT SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Other management services | |
| Database administration | DoDD 8320.1 (DoD Data Administration) |
| Floppy disk format and handling | NIST FIPS PUB 189 (POSIX.2) |
| Print management | NIST FIPS PUB 189 (POSIX.2) |
| (Complementary) | ISO 10175 (Document Printing Application) |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|--|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Architectures and applications | |
| System development security (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DoD NCSC-TG-005, v1 (TNI) |
| | DoD NCSC-TG-006, v1 (CM in Trusted Systems) |
| | DoD NCSC-TG-021, v1 (TDI) |
| | OSF DCE 1.1: Security |
| | NIST FIPS PUB 151-2 (POSIX.1) |
| | MIL-STD-498 (Software Development and Documentation) |
| Database security | NIST FIPS PUB 127-2:1993 (SQL) |
| | NIST FIPS PUB 156 (IRDS) |
| Network security architecture (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DoD NCSC-TG-005, v1 (TNI) |
| | ISO 10181-2:1993 (OSI Authentication Framework) |
| | NIST SP 500-224, pt 12,13 (OIW SIAs for OSEs) |
| | ISO 10745:1993 (OSI Upper Layer Security Model) |
| | ISO 11586-1:1994 (GULS, part 1) |
| Operating system security (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DDS-2600-5502-87 (CMW Security Requirements) |
| | DDS-2600-6243-92 (CMW Evaluation Criteria) |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | DDS-2600-6216-91 (CMW Labeling Encoding Format) |
| | DDS-2600-6243-91 (CMW Labeling Guidelines) |
| | NIST FIPS PUB 151-2 (POSIX.1) |
| | NIST FIPS PUB 112 (Password Usage) |
| System management security | |
| Privacy act (Complementary) | PL 100-235 (Computer Security Act of 1987) |
| | PL 93-579 (Privacy Act of 1974) |
| Certification and accreditation | DoD 5200.28-STD (TCSEC) |
| Security risk management (Complementary) | DoD 5200.28-STD (TCSEC) |
| | NIST FIPS PUB 191 (Guideline for LAN Security) |
| Security management (Complementary) | ISO 9595, AM4 (CMIS Access Control) |
| | ISO 10164-7 (System Management Security Alarm Reporting) |
| | ISO 10164-8 (System Management Security Audit Trail Function) |
| | ITU-T X.518 (OSI Directory-Distributed Operations) |
| | DoD 5200.28-STD (TCSEC) |
| | ISO 9596-1 (CMIP) |
| | DoD NCSC-TG-005, v1 (TNI) |
| | DoD NCSC-TG-021, v1 (TDI) |
| | NMF Omnipoint 1 |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | IEEE 1003.1b:1993 (POSIX Real-Time Extensions) |
| | NIST FIPS PUB 151-2 (POSIX.1) |
| Security association and key management (Complementary) | NIUF ISDN Security Protocol 421 (SAMP) |
| | ISO 11586-1:1994 (GULS, part 1) |
| | ISO 11586-2 (GULS, part 2) |
| | ISO 11586-3 (GULS, part 3) |
| | NIST FIPS PUB 171 (Key Management Using ANSI X9.17) |
| Security audit (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DoD NCSC-TG-005, v1 (TNI) |
| | NMF Omnipoint 1 |
| | ISO 10164-8 (System Management Security Audit Trail Function) |
| Security alarm reporting (Complementary) | ISO 10164-7 (System Management Security Alarm Reporting) |
| | NMF Omnipoint 1 |
| Authentication | |
| Personal authentication (Complementary) | DoD 5200.28-STD (TCSEC) |
| | NIST FIPS PUB 112 (Password Usage) |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | NIST FIPS PUB 48 (Automated Personal ID) |
| | ISO 9594-8.2 (OSI Directory Authentication Framework) |
| Network authentication (Complementary) | MIL-STD-2045-18500 (MHS Message Security Protocol (MSP) Profile) |
| | ITU-T X.509 (OSI Directory Authentication Framework) |
| | DoD NCSC-TG-005, v1 (TNI) |
| | NIST FIPS PUB 186 (DSS) |
| | NIST FIPS PUB 180-1 (SHS) |
| | ISO 8649 (OSI Service Definition for ACSE) |
| | ISO 8650 (OSI Protocol Specification for ACSE) |
| | ISO 11586-1:1994 (GULS, part 1) |
| | ISO 11586-2 (GULS, part 2) |
| | ISO 11586-3 (GULS, part 3) |
| | ISO 11586-4 (GULS, part 4) |
| | IEEE 802.10B-1992 (SILS Secure Data Exchange) |
| Entity authentication (Complementary) | NIST FIPS PUB 113 (Computer Data Authentication) |
| | DoD 5200.28-STD (TCSEC) |
| | ISO 9807 (Retail Message Authentication) |
| | ISO 9798-1 (Entity Authentication Mechanism) |
| | ISO 9798-3 (Entity Authentication Mechanism) |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Access control | |
| System access control (Complementary) | DoD 5200.28-STD (TCSEC) |
| | ISO 9595, AM4 (CMIS Access Control) |
| Network access control (Complementary) | ISO 9595, AM4 (CMIS Access Control) |
| | MIL-STD-2045-18500 (MHS Message Security Protocol (MSP) Profile) |
| | DoD NCSC-TG-005, v1 (TNI) |
| | IEEE 802.10B-1992 (SILS Secure Data Exchange) |
| Confidentiality | |
| Open systems confidentiality (Complementary) | DoD 5200.28-STD (TCSEC) |
| | PL 93-579 (Privacy Act of 1974) |
| | PL 100-235 (Computer Security Act of 1987) |
| Data encryption security (Complementary) | NIST FIPS PUB 46-2 (DES) |
| | NIST FIPS PUB 74 (Guidelines for DES) |
| | NIST FIPS PUB 81 (DES Modes of Operation) |
| | NIST FIPS PUB 185 (EES) |
| | NIST FIPS PUB 140-1 (Security Requirements for Cryptographic Modules) |
| | ISO 8372 (Modes of Operation for a 64-Bit Block Cipher Algorithm) |
| Traffic flow confidentiality | ISO 11577:1994 (NLSP) |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Integrity | |
| Open systems integrity (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DoD NCSC-TG-021, v1 (TDI) |
| Data integrity techniques (Complementary) | NIST FIPS PUB 46-2 (DES) |
| | NIST FIPS PUB 74 (Guidelines for DES) |
| | NIST FIPS PUB 81 (DES Modes of Operation) |
| | NIST FIPS PUB 185 (EES) |
| | NIST FIPS PUB 140-1 (Security Requirements for Cryptographic Modules) |
| | ISO 8372 (Modes of Operation for a 64-Bit Block Cipher Algorithm) |
| | NIST FIPS PUB 180-1 (SHS) |
| | NIST FIPS PUB 186 (DSS) |
| Network integrity (Complementary) | ISO 11586-1:1994 (GULS, part 1) |
| | ISO 11586-4 (GULS, part 4) |
| | IEEE 802.10B-1992 (SILS Secure Data Exchange) |
| | ITU-T X.500:1993 (OSI Directory (ISO 9594)) |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Non-repudiation | |
| Open systems non-repudiation (Complementary) | MIL-STD-2045-18500 (MHS Message Security Protocol (MSP) Profile) |
| | NIST FIPS PUB 186 (DSS) |
| | ISO 11586-1:1994 (GULS, part 1) |
| | ISO 11586-4 (GULS, part 4) |
| Electronic signature | NIST FIPS PUB 186 (DSS) |
| Electronic hashing | NIST FIPS PUB 180-1 (SHS) |
| Availability | |
| Detection and notification (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DoD NCSC-TG-005, v1 (TNI) |
| Security recovery (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DoD NCSC-TG-005, v1 (TNI) |
| Security labeling | |
| User interface security labeling (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DoD HCI Style Guide, v. 3.0; TAFIM Vol. 8 |
| | DDS-2600-6243-92 (CMW Evaluation Criteria) |
| | DDS-2600-6243-91 (CMW Labeling Guidelines) |
| | DDS-2600-6216-91 (CMW Labeling Encoding Format) |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | DoDIIS Style Guide |
| Data management security labeling (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DDS-2600-6243-92 (CMW Evaluation Criteria) |
| | DDS-2600-6243-91 (CMW Labeling Guidelines) |
| | DDS-2600-6216-91 (CMW Labeling Encoding Format) |
| Data interchange security labeling (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DDS-2600-6243-92 (CMW Evaluation Criteria) |
| | DDS-2600-6243-91 (CMW Labeling Guidelines) |
| | DDS-2600-6216-91 (CMW Labeling Encoding Format) |
| | MIL-STD-2045-48501 (Common Security Label (CSL)) |
| | ITU-T X.411 (MHS Message Transfer System: Abstract Service Definition and Procedures) |
| Graphics security labeling (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DDS-2600-6243-92 (CMW Evaluation Criteria) |
| | DDS-2600-6243-91 (CMW Labeling Guidelines) |
| | DDS-2600-6216-91 (CMW Labeling Encoding Format) |
| Data communications security labeling (Complementary) | MIL-STD-2045-48501 (Common Security Label (CSL)) |
| | DoD 5200.28-STD (TCSEC) |
| | DDS-2600-6243-92 (CMW Evaluation Criteria) |

| MAJOR SERVICE AREA: SECURITY SERVICES | |
|---|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| | DDS-2600-6243-91 (CMW Labeling Guidelines) |
| | DDS-2600-6216-91 (CMW Labeling Encoding Format) |
| Operating system security labeling (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DDS-2600-6243-92 (CMW Evaluation Criteria) |
| | DDS-2600-6243-91 (CMW Labeling Guidelines) |
| | DDS-2600-6216-91 (CMW Labeling Encoding Format) |
| Distributed computing security labeling (Complementary) | DoD 5200.28-STD (TCSEC) |
| | DoD NCSC-TG-005, v1 (TNI) |
| | DoD NCSC-TG-021, v1 (TDI) |
| | DDS-2600-6243-92 (CMW Evaluation Criteria) |
| | DDS-2600-6243-91 (CMW Labeling Guidelines) |
| | DDS-2600-6216-91 (CMW Labeling Encoding Format) |

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| MAJOR SERVICE AREA: DISTRIBUTED COMPUTING SERVICES | |
|---|--|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Client/server | |
| Threads | IEEE 1003.1c (Threads Extension to POSIX) |
| (Alternative) | OSF DCE 1.1: Threads |
| Remote procedure call | OSF DCE 1.1: RPC |
| Distributed file service | OSF DCE 1.1: DFS |
| Naming services | OSF DCE 1.1: Cell Directory Service / Global Directory Service |
| Distributed timing service | OSF DCE 1.1: DTS |
| Object services | |
| Object request broker | OMG CORBA 2.0 |
| Remote access | |
| File transfer | MIL-STD-2045-17504 (FTP) |
| Remote login | MIL-STD-2045-17506 (Remote Login Profile) |
| Remote data access | ISO/IEC 9579-1,2:1993 (RDA) |

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| MAJOR SERVICE AREA: INTERNATIONALIZATION SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Character set and data representation | |
| Coded character sets | ISO 6937:1994 (Coded Character Sets for Text Communication) |
| 7-Bit coded character sets (Complementary) | NIST FIPS PUB 1-2 (Code for Information Interchange) |
| | ISO 646:1991 (ISO 7-Bit Coded Character Set for Information Exchange) |
| 8-Bit coded character sets | ISO 4873:1991 (ISO 8-Bit Code for Information Interchange) |
| 8-Bit single byte character sets | ISO 8859:1989 (ISO 8-Bit Single-Byte Coded Graphic Character Sets) |
| Control functions | ISO 6429:1992 (Control Functions for ISO 7-Bit and 8-bit Coded Character Sets) |
| Code extension techniques | ISO 2022:1986 (ISO 7-Bit and 8-Bit Coded Character Sets - Code Extension Techniques) |
| Universal character sets | ISO 10646-1:1993 (Universal Multiple-Octet Coded Character Set) |
| Currency and funds representation | ISO 4217:1990 (Codes for the Representation of Currencies and Funds) |
| Date and time representation (Complementary) | NIST FIPS PUB 4-1 (Representation of Calendar Date and Ordinal Date) |
| | NIST FIPS PUB 58-1 (Representation of Local Time of Day) |
| | NIST FIPS PUB 59 (Representations of Universal Time, Local Time Differentials, and US Time Zone References) |
| Country name representation | TBD |

| MAJOR SERVICE AREA: INTERNATIONALIZATION SERVICES | |
|--|---|
| Mid and Base Service Areas (Indented) | Adopted Standard or Specification |
| Representation of human sexes | TBD |
| Representation of names of languages | TBD |
| Cultural convention services | |
| Numerical value representation | TBD |
| Customization to local norms | X/Open G304 (Internationalisation Guide, Version 2) |
| (Complementary) | DOD HCI Style Guide |
| Natural language support services | |
| Keyboard device layout | ISO 9995-1..8:1994 (Keyboard Device Layout |
| Related standards and programs | |
| Character set registration | TBD |

A.2 INDEX OF SERVICE AREAS

The following list is an index of the service areas of the AITS, in alphabetical order. MLSAs appear in *italics*. MSAs appear in **bold**.

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APPENDIX B

GLOSSARY

Base Service Area (BSA): The lower level of granularity below the Mid Level Service Area which provides the most precise description of IT functionality in any Major Service Area. The BSAs further decompose the IT functionality in each Mid Level Service Area category.

Consensus based: Making decisions based on the agreement of a large majority of the participants.

Major Service Area (MSA): The highest level of IT functionality. MSAs provide the overall set of standards services that support the objectives of application portability and system interoperability.

Mid Level Service Area (MLSA): A division of the MSA that provides like functionality and further decomposes the IT functionality. This decomposition is intended to provide a more precise description of each MSA. The number of categories in each Mid Level Service Area varies, depending on the variation and complexity of the functionality included in the MSA.

Open Systems Environment (OSE): A comprehensive set of interfaces, services, and supporting formats, plus user aspects for interoperability or for portability of application, data or people, as specified by information technology standards and profiles.

Profile: A set of one or more base standards, along with specific subsets, classes, options, and parameters, necessary for accomplishing a particular function.

Publicly Available: Available to public without restriction to anyone for implementation, sublicensing, and distribution (i.e., sale) of that implementation.

Specifications: A document that prescribes, in a complete, precise, verifiable manner, the requirements, design, behavior, or characteristics of a system or system component. The term is also used to identify additional information that augments a standard.

Sponsor: An advocate for a specific standard or section of a standard who provides significant resources toward the development of the standard.

Standard Selection Criteria: Criteria used in the selection of standards for a profile.

Standard: A document, established by consensus and approved by a government or non-government standards body, that provides, for common and repeated use, rules, guidelines, or characteristics for activities or their results, aimed at the achievement of the optimum degree of order and consistency in a given context.

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APPENDIX C

ACRONYMS

| | |
|---------|---|
| ACSE | Association Control Service Element |
| ADATP | Allied Data Transfer Protocol |
| ADP | Automated Data Processing |
| AES | Application Environment Specification |
| AIS | Automated Information System |
| AITs | Adopted Information Technology Standards |
| ANSI | American National Standards Institute |
| API | Application Program Interface |
| APP | Application Portability Profile |
| ARIDPCM | Adaptive Recursive Interpolative Pulse Code Modulation |
| ATDL | Army Tactical Data Link |
| ATM | Asynchronous Transfer Mode |
| | |
| BDF | Bitmap Distribution Format |
| BPS | Bits per Second |
| BSA | Base Service Area |
| | |
| C3I | Command, Control, Communications, and Intelligence |
| C4I | Command, Control, Communications, Computers, and Intelligence |
| CALS | Continuous Acquisition and Lifecycle Support |
| CASE | Computer Aided Software Engineering |
| CFS | Center for Standards |
| CGI | Computer Graphics Interface |
| CGM | Computer Graphics Metafile |
| CINC | Commander in Chief |
| CITIS | Contractor Integrated Technical Information Service |
| CJCS | Chairman of the Joint Chiefs of Staff |
| CJCSI | CJCS Instruction |
| CJCSM | CJCS Manual |
| CM | Configuration Management |
| CMIP | Common Management Information Protocol |
| CMIS | Common Management Information Service |
| CMP | Configuration Management Plan |
| CMW | Compartmented Mode Workstation |

| | |
|--------|--|
| CORBA | Common Object Request Broker Architecture |
| COSE | Common Open System Environment |
| CSL | Common Security Label |
| CTE | Compound Text Encoding |
| DCE | Data Circuit-Terminating Equipment |
| DCE | Distributed Computing Environment |
| DEA | Data Encryption Algorithm |
| DES | Data Encryption Standard |
| DFS | Distributed File System |
| DIGEST | Digital Geographic Information Exchange Standard |
| DIS | Draft International Standard |
| DISA | Defense Information Systems Agency |
| DME | Distributed Management Environment |
| DMTD | Digital Message Transfer Device |
| DNS | Distributed Name Service |
| DoD | Department of Defense |
| DoDD | DoD Directive |
| DoDI | DoD Instruction |
| DoDIIS | DoD Intelligence Information Systems |
| DQDB | Distributed Queue Dual Bus |
| DSS | Digital Signature Standard |
| DTE | Data Terminal Equipment |
| EDI | Electronic Data Interchange |
| EEI | External Environment Interface |
| EES | Escrowed Encryption Standard |
| EIA | Electronics Industries Association |
| FIPS | Federal Information Processing Standard |
| FTP | File Transfer Protocol |
| GUI | Graphical User Interface |
| GULS | Generic Upper Layer Security |
| HCI | Human-Computer Interface |
| HDBK | Handbook |
| ICCCM | Inter Client Communication Conventions Manual |

| | |
|-------|--|
| IEC | International Electrotechnical Commission |
| IEEE | Institute for Electrical and Electronics Engineers |
| IETM | Interactive Electronic Technical Manual |
| IGES | Initial Graphics Exchange System |
| IJMS | Interim JTIDS Message Specification |
| IM | Information Management |
| IRDS | Information Resources Directory System |
| ISAM | Indexed Sequential Access Method |
| ISDN | Integrated Services Digital Network |
| ISO | International Organization for Standardization |
| ISP | International Standardized Profile |
| ISP | ISDN Security Protocol |
| IT | Information Technology |
| ITSG | Information Technology Standards Guidance |
| ITU-T | International Telecommunications Union- Telecommunications |
| | |
| JIEO | Joint Interoperability and Engineering Organization |
| JPEG | Joint Photographic Experts Group |
| JTIDS | Joint Tactical Information Distribution System |
| | |
| LAN | Local Area Network |
| LCM | Life Cycle Management |
| LIS | Language Independent Specification |
| LSA | Logistic Support Analysis |
| | |
| MCCR | Mission Critical Computer Resources |
| MHS | Message Handling System |
| MLSA | Mid Level Service Area |
| MNS | Mission Needs Statement |
| MPEG | Motion Picture Experts Group |
| MSA | Major Service Area |
| MSP | Message Security Protocol |
| MTF | Message Transfer Format |
| | |
| NCSC | National Computer Security Center |
| NIST | National Institute of Standards and Technology |
| NITFS | National Imagery Transmission Format Standard |
| NIUF | National ISDN Users' Forum |
| NLSP | Network Layer Security Protocol |

| | |
|--------|---|
| NMF | Network Management Forum |
| OIW | OSE Implementors Workshop |
| ORD | Operational Requirements Document |
| OSE | Open Systems Environment |
| OSE/IA | OSE Profile for Imminent Acquisitions |
| OSF | Open Software Foundation |
| OSI | Open Systems Interconnection |
| OT&E | Operational Test and Evaluation |
| PCMCIA | Personal Computer Memory Card International Association |
| PEX | PHIGS Extensions to X |
| PHIGS | Programmer's Hierarchical Interactive Graphics System |
| PMP | Program Management Plan |
| POC | Point of Contact |
| POSIX | Portable Operating Systems Interface for Computers |
| PUB | Publication |
| RDA | Remote Data Access |
| RFC | Request for Comment |
| RPC | Remote Procedure Call |
| SAG | SQL Access Group |
| SAMP | Security Association Management Protocol |
| SCC | Standards Coordinating Committee |
| SGML | Standard Generalized Markup Language |
| SHS | Secure Hashing Standard |
| SIA | Stable Implementation Agreement |
| SILS | Standards for Interoperable LAN Security |
| SMTP | Simple Mail Transfer Protocol |
| SOP | Standing Operating Procedures |
| SP | Special Publication |
| SQL | Structured Query Language |
| SSL | Standard Security Label |
| STANAG | Standardization Agreement |
| STD | Standard |
| STEP | Standard for the Exchange of Product Model Data |

| | |
|---------|---|
| TACO | Tactical Communication Protocol |
| TADIL | Tactical Digital Information Link |
| TAFIM | Technical Architecture Framework for Information Management |
| TBD | To Be Determined |
| TCSEC | Trusted Computer Systems Evaluation Criteria |
| TDI | Trusted Database Interpretation |
| TEMP | Test and Evaluation Master Plan |
| TIDP-TE | Technical Interface Design Plan - Test Edition |
| TLSP | Transport Layer Security Protocol |
| TNI | Trusted Network Interpretation |
| TRM | Technical Reference Model |
| TX | Transaction Demarcation |
| TxRPC | Transactional Remote Procedure Call |
| | |
| UIDL | User Interface Definition Language |
| | |
| VHDL | VHSIC Hardware Description Language |
| VMF | Variable Message Format |
| | |
| WMO | World Meteorological Organization |
| WORM | Write-Once Read Many |
| | |
| XA | X/Open Architecture |
| XATMI | X/Open Application to Transaction Manager Interface |
| XA+ | X/Open Architecture Plus |
| XDR | External Data Representation |
| XLFD | X Logical Font Description |

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APPENDIX D

PROPOSING CHANGES TO THE AITS

D.1 INTRODUCTION

This appendix provides guidance for submission of proposed AITS changes. These proposals should be described as specific wording for line-in/line-out changes to a specific part of the AITS.

Use of a standard format for submitting a change proposal will expedite the processing of changes. The format for submitting change proposals is shown in Section D.2. Guidance on the use of the format is provided in Section D.3.

The preferred method of proposal receipt is via e-mail in ASCII format, sent via the internet. If not e-mailed, the proposed change, also in the format shown in Section D.2, and on both paper and floppy disk, should be mailed. As a final option, change proposals may be sent via fax; however, delivery methods that enable electronic capture of change proposals are preferred. Address information for sending change proposals is shown below.

Internet: stantonj@ncr.disa.mil, with a copy to tafim@bah.com

Mail: Information Processing Directorate
 DISA/JIEO/CFS/JEBE (John Stanton)
 10701 Parkridge Blvd
 Reston, Virginia 22091-4398

Fax: (703) 735-3257; indicate "AITS" on cover sheet

D.2 AITS CHANGE PROPOSAL SUBMISSION FORMAT

a. Point of Contact Identification

(1) Name:

(2) Organization and Office Symbol:

(3) Street:

(4) City:

- (5) State:
- (6) Zip Code:
- (7) Area Code and Telephone #:
- (8) Area Code and Fax #:
- (9) E-mail Address:

b. Document Identification

- (1) Volume Number:
- (2) Document Title:
- (3) Version Number:
- (4) Version Date:

c. Proposed Change #1

- (1) Section Number
- (2) Page Number:
- (3) Title of Proposed Change:
- (4) Wording for Proposed Change:
- (5) Rationale for Proposed Change:
- (6) Other Comments:

d. Proposed Change #2

- (1) Section Number
- (2) Page Number:
- (3) Title of Proposed Change:
- (4) Wording for Proposed Change:

(5) Rationale for Proposed Change:

(6) Other Comments:

e. Proposed Change #n

(1) Section Number

(2) Page Number:

(3) Title of Proposed Change:

(4) Wording for Proposed Change:

(5) Rationale for Proposed Change:

(6) Other Comments:

D.3 FORMAT GUIDANCE

The format in Section D.2 should be followed exactly as shown. The format can accommodate, for a specific TAFIM document, multiple change proposals for which the same individual is the Point of Contact (POC). This POC would be the individual who could be contacted on any question regarding the proposed change. The information in the **Point of Contact Identification** part (D.2a) of the format would identify that individual. The information in the **Document Identification** part of the format (D.2b) is self-evident, except that volume number would not apply to the CMP or PMP. The proposed changes would be described in the **Proposed Change #** parts (D.2c, D.2d, or D.2n) of the format.

In the **Proposed Change #** parts of the format, the Section number refers to the specific subsection of the document in which the change is to take place (e.g., Section 2.2). The page number (or numbers, if more than one page is involved) will further identify where in the document the proposed change is to be made. The Title of Proposed Change field is for the submitter to insert a brief title that gives a general indication of the nature of the proposed change. In the Wording of Proposed Change field the submitter will identify the specific words (or sentences) to be deleted and the exact words (or sentences) to be inserted. In this field providing identification of the referenced paragraph, as well as the affected sentence(s) in that paragraph, would be helpful. An example of input for this field would be: "Delete the last sentence of the second paragraph of the section and replace it with the following sentence: 'The working baseline will only be available to the TAFIM project staff.'" The goal is for the commenter to provide proposed wording that is appropriate for insertion into the document without editing. The D.2 c (5), D.2 d (5), or D.2 n (5) entry in this part of the format is a discussion of the rationale for the change. The rationale may include reference material. Statements such as "industry practice" would carry less weight than specific examples. In

addition, to the extent possible, citations from professional publications should be provided. A statement of the impact of the proposed change may also be included with the rationale. Finally, any other information related to improvement of the document may be provided in the Other Comments field. However, without some degree of specificity these comments may not result in change to the document.